

Developing Multilingual Language Learning Resources Using the CEFR-J

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Abstract

In Japan, the project called the CEFR-J was launched in 2008, and a set of can-do descriptors for 10 CEFR sub-levels (Pre-A1 to B2.2) and related Reference Level Description (RLD) work including profiling vocabulary, grammar, and textual features have been developed. In this study, the English resources created for the CEFR-J will be applied to prepare teaching resources for other major European as well as Asian languages. To do this, a series of teaching/learning resources including the CEFR-J Wordlist and Phrase List initially developed for English were translated into 26 other languages, using neural machine translation. Second, these translated word and phrase lists were manually corrected by a team of language experts. This automatic conversion of English to other languages was evaluated against human judgments as well as frequency analysis from web corpora. Three types of e-learning resources were created based on the wordlists and the phrase lists for teaching those languages to undergraduate students: (1) a flash-card app for learning vocabulary classified by thematic topic and CEFR level; (2) a web-based sentence pattern writing tool for learning grammar and vocabulary, and (3) a web-based spoken and written production corpus collection tool.

Keywords: CEFR, multilingual resources, e-learning

1. Introduction

The Common European Framework of Reference for Languages (CEFR) was published in 2001 (Council of Europe, 2001). The CEFR is a common framework for learning, teaching and assessing a given foreign language. It has six levels (A1, A2, B1, B2, C1, and C2) on the vertical axis and skill areas (reception, interaction, production and mediation) on the horizontal axis. Commonly, these skill areas consist of Listening, Reading, Spoken Interaction, Spoken Production and Writing¹. The framework has a third dimension, which involves other aspects of communicative competence, such as sociolinguistic, pragmatic, and strategic competences.

With the growing influence of the CEFR outside the EU to the rest of the world, people working in foreign language teaching and learning have started to explore the potential of the CEFR in their fields. Most salient change has been made in the area of language testing. Many foreign language proficiency tests are aligned to the respective CEFR levels and claim to be mutually comparable. As of August, 2018, the certificates of more than 30 languages are aligned to the CEFR levels according to Wikipedia².

In 2008, we launched a project called the CEFR-J to compile our own original framework based on the CEFR for English language teaching in Japan (Negishi, Takada, and Tono 2013; Tono, 2013; Negishi and Tono, 2016). Some of the unique features of the CEFR-J are (1) more refined sub-levels of the CEFR (Pre-A1, A1.1-1.3, A2.1-2.2, B1.1-1.2, B2.1-2.2) with newly created and scaled descriptors, (2) the preparation of grammar and vocabulary to go with each CEFR-J level, (3) the analysis of text features to represent the CEFR-J levels, and (4) the development of tasks and tests to serve each CEFR-J descriptor (Tono, 2017). The first version of the CEFR-J

was released in March 2012 and has been publicly available both for research/teaching and commercial purposes. It has been widely used as a supplement to the CEFR in Japan.

2. The CEFR-J x 27 Project

The CEFR-J x 27 belongs to the Super Global University (SGU) program at Tokyo University of Foreign Studies (TUFS). TUFS is a national university specializing in foreign language and culture studies, where we offer 27 different foreign languages as undergraduate majors. The number of foreign languages offered at TUFS for general education purposes exceeds 80, out of which 27 foreign languages stand as an independent major³.

Despite a long history of teaching many European and Asian languages at TUFS, there was no coherent or systematic framework for teaching those languages and assessing the outcomes of our program. The recent development of the CEFR and its related resources was quite inspiring to us in the sense that they offer an opportunity to systematize our teaching/learning environment by critically evaluating the current situation in light of the common framework. Also, I have been working as a principal investigator of the CEFR-J project for English, which is the reason why the university set out to launch the CEFR-J x 27 project.

This paper is an interim report on the CEFR-J x 27 project and discusses the value of constructing pedagogical resources shared across different languages and how to develop such resources using NLP technologies. First, a description of Reference Level Descriptions (RLDs) for English will be made (3.), and then the method of mapping the resources to multiple languages will be described (4. and 5.). Finally, as an application of the pedagogical resources, the development of three e-learning tools will be

¹ The self-assessment grid of the 2001 version has only one area in writing, whereas the 2018 companion volume divides writing into written *interaction* and written *production*.

² http://en.wikipedia.org/wiki/Common_European_Framework_of_Reference_for_Languages

³ In April 2018, the number of the languages offered became 28, but the project title we use is currently still the CEFR-J x 27.

discussed and the prototype versions will be described in detail (6.).

3. CEFR-J RLD Work for English

3.1 Reference Level Descriptions

The CEFR is potentially applicable to any language and does not, therefore, relate to any specific one. However, textbook authors, syllabus designers and language teachers have found its specifications to be insufficiently precise, due to the language-independent nature of the framework. Therefore, Reference Level Descriptions (RLDs) have been drawn up language by language to provide reference descriptions based on the CEFR for individual languages.

The Council of Europe website on RLDs explain the details as follows: “These RLDs are made up of ‘words’ of a language rather than general descriptors. Reference levels identify the forms of a given language (words, grammar and so on), mastery of which corresponds to the competences defined by the CEFR. They transpose the CEFR descriptors into specific languages, level by level, from A1 to C2⁴.”

According to the Council of Europe website⁵, RLDs are so far available for the following languages: Croatian, Czech, English, German, French, Italian, Portuguese and Spanish. As regards English, there are a few different projects related to RLDs. The English Profile (Hawkins and Filipović, 2013) is an official RLD work carried out by a team consisting of Cambridge University, Cambridge English Assessment, Cambridge University Press, and University of Bedfordshire⁶. More simplified content specifications are provided by the British Council and EAQUALS in the *Core Inventory for General English* (North, Ortega and Sheehan, 2010). In addition to these academic projects, Pearson developed its original scale called *Global Scale of English* (GSE)⁷, which extends the CEFR by pinpointing on a scale from 10 to 90 what needs to be mastered for the four skills of speaking, listening, reading and writing within a CEFR level, using a more granular approach. GSE also provides its unique Teacher Toolkit⁸, which contains 2,000 GSE learning objectives, 450 grammar objectives, and vocabulary (39,000 words and 80,000 collocations) ordered by GSE scores.

3.2 The CEFR-J RLD project

After the release of the CEFR-J version 1 in 2012, we also started to prepare RLDs for the CEFR-J in three major areas: (i) vocabulary, (ii) grammar and (iii) text properties.

3.2.1 The CEFR-J Wordlist

In order to develop the wordlists for the CEFR-J, a close examination was made regarding the frequency analysis of English textbooks used at primary and secondary schools in nearby Asian countries/ regions (e.g. China, Korea, and Taiwan). They were not specifically designed based on the CEFR, but we assessed the approximate CEFR levels of the textbooks by examining the learning objectives described in their national curriculums. In this way, we prepared Pre-A1 to B2 level sub-corpora, each of which comprises

textbook data. In the analysis of CEFR-level textbook corpora, the texts were first tagged for parts of speech, using TreeTagger (Schmid, 1994) and then the frequency lists of lemmas with POS were created for each textbook published in each country/region as well as each CEFR level. Finally, the Pre-A1 words were determined by selecting the only words that appeared in all the three regions’ textbooks classified at the Pre-A1 level. The A1-level words were then extracted in the same way, after subtracting all the Pre-A1 words from the texts in advance. In this way, vocabulary for each CEFR level was determined. Interestingly, since the vocabulary growth between Pre-A1 and A1-levels was very small (only 100 words), the two levels were merged into A1-level. Table 1 shows the breakdown of the wordlist. The ‘Corpus’ row indicates the initial query results of the words found across all the three regions’ textbooks at a given level. The third row shows our initial target number of words. Altogether we expected to have 6,000 words from A1 to B2 levels, but after the analysis of textbook corpora, we compared our results with the English Vocabulary Profile (EVP) compiled by the English Profile team and found that while the first two levels (A1 and A2) cover a relatively homogeneous set of words, there is a larger gap in B1 and B2 level words between the two lists, so we decided to incorporate those words which are missing from our list, but exist in the EVP. The row called ‘Final Version’ shows the number of entries in the final version of the wordlist.

Level	A1	A2	B1	B2	Total
Corpus	976	1057	1884	1722	5639
Our initial target	1000	1000	2000	2000	6000
Final Version	1068	1358	2359	2785	7570

Table 1: The breakdown of the CEFR-J Wordlist

The final version of the wordlist was then annotated with the notion categories from the *Core Inventory* and *Threshold Level* (van Ek and Trim, 1990), which enables the users to extract level-appropriate vocabulary belonging to a particular thematic category. Table 2 shows a sample list of entries from the CEFR-J Wordlist.

Entry	CEFR level	POS	Thematic domains
activity	A1	n	Leisure activities
actor	A1	n	Work and Jobs
age	A1	n	Personal information
airplane	A1	n	Ways of travelling
airport	A1	n	Travel and services vocab
animal	A1	n	
answer	A1	n	
apple	A1	n	Food and drink
apron	A1	n	Objects and rooms

Table 2: The entries of the CEFR-J Wordlist

⁴ <https://www.coe.int/en/web/common-european-framework-reference-languages/reference-level-descriptions> (accessed August 15, 2018).

⁵ The same as the URL in footnote 4.

⁶ The English Profile official page (<http://www.englishprofile.org/>)

⁷ <https://www.pearsonelt.com/about/gse.html>

⁸ <https://www.english.com/gse/teacher-toolkit/user/10>

The CEFR-J Wordlist was made publicly available in 2012. One can access the wordlist at the resource page of the CEFR-J website⁹. This wordlist will serve as one of the important resources for the CEFR-J x 27 project later on.

3.2.2 The CEFR-J Grammar Profile

In the JSPS KAKAN project (Kiban A; No. 24242017; 2012-15), we conducted RLD research similar to previous projects such as the English Profile or the Core Inventory. There were two reasons why we had an independent RLD project. First, the CEFR-J has many sub-levels under A1 to B2, and it was desirable to specify grammar and vocabulary to go with each sub-level. For this purpose, the resources provided by the English Profile or the Core Inventory were not sufficient. Second, past reports on RLDs did not always specify the procedure of how each item of grammar or vocabulary was assigned to a given CEFR level. Overall methods were presented, but they did not make the actual data available. Thus, we had a genuine methodological interest in how to do RLDs in an objective, valid way. We aimed to be as transparent as possible throughout all the stages of RLD work, and made sure that the procedure should be available as a standard for those who wish to do their own RLD research. In addition, we used corpus-based approaches similar to the English Profile, and our profiling technique was very different from theirs, which would be methodologically interesting to compare.

In our project, identification of the CEFR levels was considered a type of classification task defined in the field of Natural Language Processing (NLP). Figure 1 illustrates this point. Basically, it involves supervised learning of features in the texts with the CEFR level information. First, a machine creates a certain model based on a set of feature vectors from training texts with some class information, such as CEFR levels. Then the model predicts a CEFR level when a new text is given.

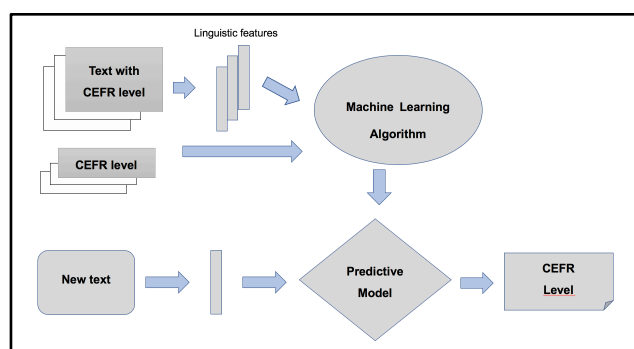


Figure 1: The supervised learning for CEFR-J RLDs

The strength of this machine learning approach is to know the relative importance of the predictive features used for the classification. In our case, that is the question of which grammatical items play an important role in classification. In the English Profile, these features are called ‘Critical Features’ (Hawkins and Filipović, 2012). A feature is *critical* when the occurrences of this feature are so prominent at the given CEFR level that it helps distinguish that CEFR level from the rest. To prove this, we need information that this feature is significantly more frequent at a given CEFR level than the others. To make matters

more complicated, the CEFR level decision by humans is made not solely on a single feature but a bundle of lexical or grammatical features. Therefore, we used this machine learning algorithm not only to create a model to best predict the CEFR levels, but also to select the best combination of grammatical features as predictors.

To this end, we prepared two types of corpora, ELT textbook corpora as ‘input’ and learner corpora as ‘output’. These two types of corpora were needed in order to do RLDs for both teaching and assessment purposes. The ‘input’ corpus is a collection of CEFR-based course books published in the U.K. Since there is no CEFR-based English textbook published in Japan yet, course books published in the U.K. after the release of the CEFR in 2001 were collected and their content examined to see whether the textbooks were designed with appropriate CEFR levels in mind. In total, 96 textbooks were gathered, which were scanned with OCR and prepared in an XML format. Each piece of textbook data in the corpus was tagged for CEFR level, section information for different skills (4 skills and grammar), part-of-speech and lemma for each word. The data set (c. 1,640,000 tokens) was prepared for both normal text processing and concordancing using Sketch Engine¹⁰.

The ‘output’ corpus is two sets of learner corpora: the JEFLL Corpus (Tono, 2007) and the NICT JLE Corpus (Izumi et al. 2004). The JEFLL Corpus is a collection of approximately 10,000 secondary school students’ written compositions (size: 0.7 million), and the NICT JLE Corpus is a collection of oral interview test scripts by 1,280 test-takers (size: 2 million). Both sets of data were originally gathered without CEFR levels, but for this project all the sample texts were aligned to the CEFR levels.

The extraction of grammar items from the two types of corpora was mainly done by my colleague in the CEFR-J project (Ishii, 2016; Ishii and Tono, 2016). Altogether, approximately 500 grammar items were automatically extracted by using a set of pattern matching queries for each item. The frequencies and dispersion measures were obtained for each grammar category at all the CEFR levels and the matrix of [grammar category] x [each text with CEFR-levels] was used for machine learning. Several machine learning algorithms were tested, and random forest and ranking Support Vector Machine (SVM) were used for the final analysis (Tono, 2017).

The CEFR-J Grammar Profile was released as a dataset first in March 2018, followed by the English teacher-friendly version in fall 2018.

3.2.3 The CEFR-J Text Profile

Another important aspect of CEFR-level criteria is the characteristics of texts provided as input to learners at given CEFR levels. While many readability measures have been proposed (cf. DuBay, 2004), many of them were mainly concerned with word levels and sentence length and did not include more complex lexical and syntactic features. The RLD project described above revealed more detailed vocabulary and grammar features relevant to each CEFR level. It is the co-occurrences of those linguistic features in the text that could serve as criteria for a particular CEFR level.

⁹ <http://www.cefr-j.org>

¹⁰ <http://www.sketchengine.co.uk>

To this end, we extracted various textual features such as the CEFR levels of words in the text, the length of clauses and sentences, the number of verbs in the sentence, the depth of parsed tree of the sentence, and the ratio of difficult words in the noun phrases with more than two depth of trees. For detail, see Mizushima, et al. (2016); Uchida (2018).

4. Using the CEFR-J for Other Languages

So far, the historical development of the CEFR-J and its related pedagogical resources has been described in detail. Originally the CEFR-J was designed to respond to the specific needs of English language teaching in Japan, but recently there is a growing interest in adopting the CEFR-J back into the CEFR itself or applying the framework developed for the CEFR-J to foreign languages other than English. For instance, in the Council of Europe (2017), they added Pre-A1 level to the entire scale, as the CEFR-J originally proposed, and a large number of young learners' descriptors were supplied, for which approximately 30 descriptors were adopted from the CEFR-J.

Tokyo University of Foreign Studies (TUFS), where the presenter works, is the only national university in Japan that specializes in foreign language teaching with currently 28 foreign language majors. In 2014, TUFS launched a government-funded project called the Super Global University Program, where a special focus is on the development of the systematic program for teaching and assessing the 28 foreign languages that TUFS students can major in. The university has decided to use the CEFR-J as

a core framework and I was appointed as the principal investigator of the CEFR-J x 28 project¹¹.

Table 3 shows the list of languages offered as majors at our institution:

English	Japanese	German	French	Spanish
Cambodian	Russian	Chinese	Korean	Czech
Vietnamese	Thai	Urdu	Polish	Korean
Portuguese	Malaysia	Filipino	Turkish	Hindi
Mongolian	Laotian	Italian	Arabic	Persian
Indonesian	Burmese	Bengali		

Table 3: The list of languages for the CEFR-J x 28 project

5. A General Approach for Developing Pedagogical Resources

In the CEFR-J x 28 project, we share the CEFR-J as a common framework, which is also linked to the original CEFR as a foundation. The advantage of using the CEFR-J is its detailed sub-levels. There are four sub-levels up to A1 (Pre-A1, A1.1-1.3), followed by additional six levels from A2 to B2 (A2.1, A2.2, B1.1, B1.2, B2.1, B2.2). These levels almost correspond with the recently updated CEFR levels (Council of Europe, 2018). As was illustrated in the RLD work (Section 3), a set of resources such as the CEFR-J Wordlist, the CEFR-J Grammar Profile, and the CEFR-J Text Profile are available, which provided a good starting point for our project to explore the possibility of converting English resources into each language, using automatic techniques such as machine translation.



Figure 2: The relation between a set of can-do descriptors and lexical and grammatical resources

Figure 2 shows our basic approach. Before converting the English resources into 27 other languages, careful planning was conducted to decide at what level such automatic conversion should be attempted. If a simple one-to-one machine translation was made for a certain word in English, the chances are that most content words (nouns and adjectives) with a single meaning can be converted fairly accurately into a given language, whereas most of the grammatical words and polysemous words will fail, due to various structural and semantic mismatches between the two languages.

However, consider the level of language functions such as “express likes or dislikes.” A set of model constructions can be selected to realize such functions, like “I like ...”, “I don’t like ...”, “Do you like ...?” or “What do you like?” At

this level, translating English phrases into the counterpart in a given language is more likely to be successful, due to the availability of contextual information derived from specified language functions. Also, if specific content words, e.g. sports, foods, favorite pastime, are used with these constructions to form a sentence, then the automatic translation of these sentences are more likely to succeed, given the detailed contexts provided at a sentence level.

Interestingly, the CEFR provides this very list of can-do descriptors for each level. Therefore, we have decided to first compile a list of words and constructions that should go with each set of can-do descriptors at a given CEFR-J level. This resource is called the CEFR-J CAN-DO Phrase Database. This phrase database serves as the primary input to feed into a machine translation system. For the first test

¹¹ The project used to be called the ‘CEFR-J x 27’, but recently one more language was added to the majors, thus now we have 28 language majors.

run, we used Google Translate. In the past few years, the level of machine translation has drastically improved since the innovation made by neural machine translation (NMT). The translation quality of Google Translate has become impressively high, compared to a few years ago.

Table 4 shows some examples of the CEFR-J CAN-DO Phrase Database and its multilingual version.

CEFR-J A1.2 spoken interaction can-do	I can exchange simple opinions about very familiar topics such as likes and dislikes for sports, foods, etc., using a limited repertoire of expressions, provided that people speak clearly.
Function	Expressing pleasure, liking
Construction	I like + NP (very much).
Japanese	NP を(とても) 好きです
Arabic	NP + أنا أحب
Turkish	NP + (çok) severim.
Thai	ฉันชอบ + NP (มาก ๆ)

Malaysia	Saya suka + NP sangat
Burmese	NPကို အရမ်း(ကိတ်)တယ်။
Indonesian	Saya suka + (sekali)
Bengali	আমি + NP খুব পছন্দ করি.
Chinese	我 (非常) 喜欢+NP
German	Ich mag + NP (sehr gerne).
Mongolian	Маш их
Russian	Мне (очень) нравится

Table 4: Sample database entries for CEFR-J A1.2 spoken interaction descriptor

We are now at a preliminary stage, evaluating the output of machine translation over various types of resources, including the CEFR-J Wordlist itself as well as a part of the Phrase Database. A team of linguists, computer engineers, as well as language instructors work together to make the most of the CEFR-J and its related resources for creating pedagogical resources for 27 other languages (Fig. 3).

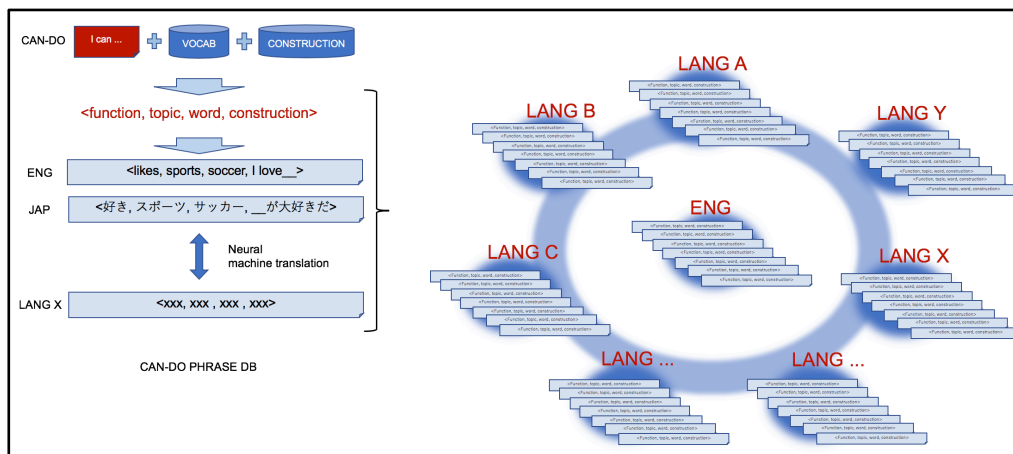


Figure 3: The image of CEFR-J-based pedagogical resources shared among 28 languages

6. Developing E-learning Tools and Apps for Teaching 28 Languages

As we develop the CEFR-J pedagogical resources for 28 languages, three types of e-learning tools and applications have been developed¹².

6.1 The Flash Card Vocab Builder

An iPhone/Android app for learning vocabulary in 28 different languages called the Flash Card Vocab Builder (FCVB) was developed. This is a simple flash card type application, in which learners can choose any one of 28 languages and learn content words such as verbs, nouns and adjectives. One unique feature is that the words are grouped together according to the thematic categories based on *Threshold Level* (van Ek and Trim, 1990) as well as the CEFR levels determined by English equivalents. In this way, they can learn basic everyday vocabulary in a given language using flash cards on their smartphones (Fig 4).



Figure 4: The Flash Card Vocab Builder (a) Language menu, (b) CEFR levels and (c) Themes

On the menu, you can select one of 28 languages. Once you select a language, you will be asked to choose a CEFR level you want to study, which will take you to the list of words grouped together according to the thematic domains based

¹² Currently, these tools and apps are available for internal use only. TUFS has a plan to make them open to public once the SGU project is over.

on Threshold Level. The translation can be shown in either English or Japanese, so this app can be used for speakers whose L1 is one of the 27 languages and want to study Japanese.

Figure 5 shows the main study page. You can see the card in the center, and you just flip the page to the left (Don't know yet) or to the right (I got it!). The log file is kept on the server and teachers can check each learner's progress in terms of how many words are learned for each CEFR level and for what thematic categories.

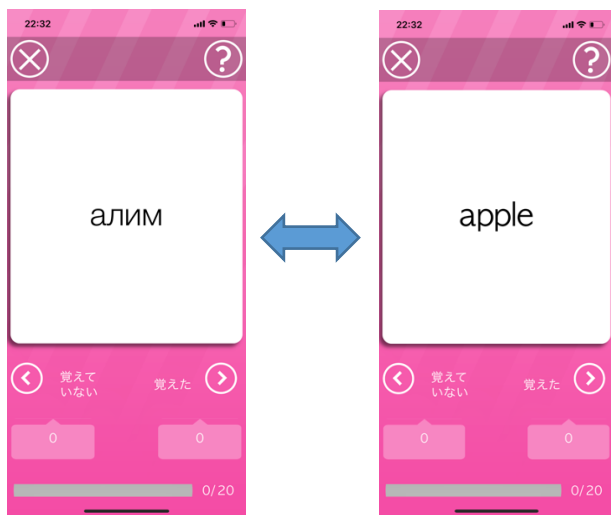
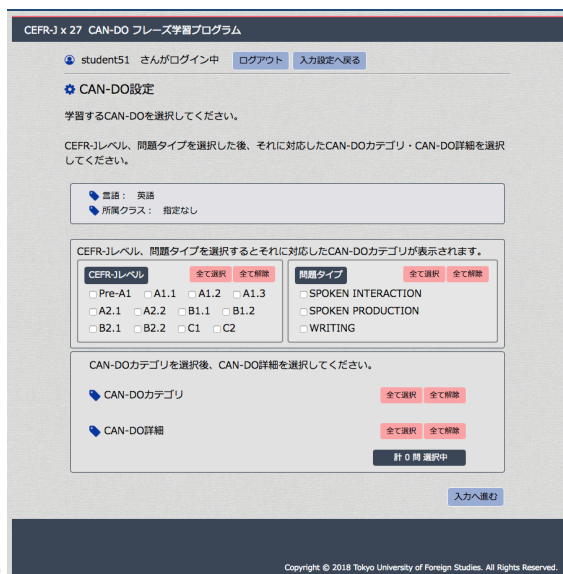


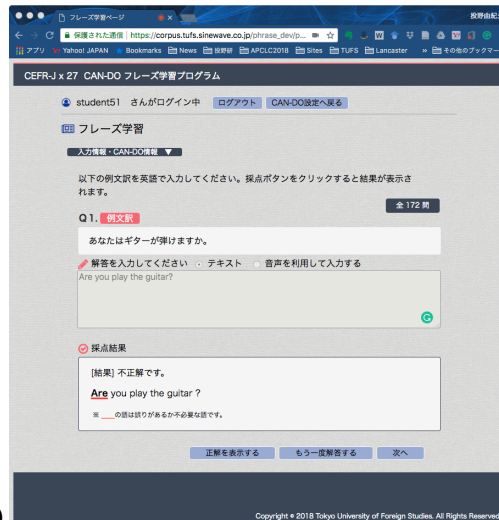
Figure 5: The main study page of the FCVB

6.2 The CAN-DO Sentence Builder

The second tool is a web writing tutor. Figure 6-(a) shows the menu of specific CEFR levels and skills. When a learner chooses levels and skills, specific can-do descriptors will be displayed. When you select particular descriptors, you will be taken to a writing practice screen shown in Figure 6-(b).



(a)



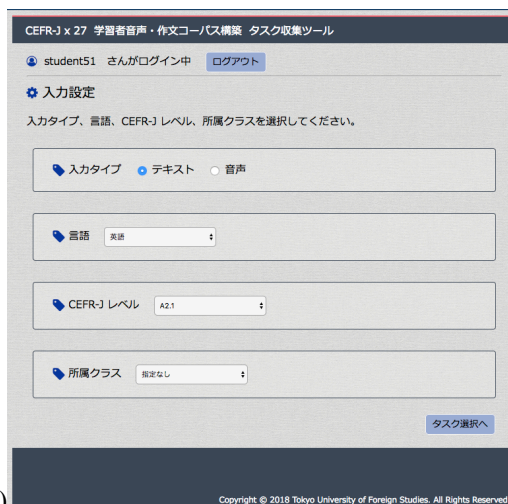
(b)

Figure 6: The CAN-DO Sentence Builder

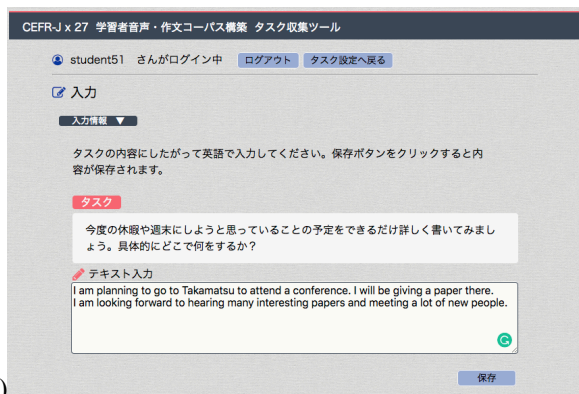
The sentence cues will be provided in either Japanese or English. You translate the sentence into the target language. In this case, “Can you play the guitar?” is the target sentence. Any character strings that do not match the target will be highlighted as in the bottom of the screen, suggesting either something is missing (omission error), something is redundant (addition error) or some forms are wrong (misformation error). This judgement is based on the comparison between the target string and the input string only and not very intelligent yet. But at least if you have specific can-do descriptors and their functions, it would be useful to go through basic sentences comprised of useful constructions and topic vocabulary. The nice thing about this tool is that all the 28 languages have the same format. Once you learn one language, it is possible to learn additional language in the same way, or even in parallel.

6.3 The CAN-DO Task-Based Spoken/Written Corpus Collection Tool

The final tool is a web-based corpus collection interface. At this site, students can choose from the main menu a choice of their language and their estimated CEFR levels, and they will be shown a list of topics for speaking or writing, tuned to a particular CEFR level selected, as in Figure 8-(a).



(a)



(b) Figure 8. The CAN-DO Task-Based Spoken/Written Corpus Collection Tool

Then students will be taken to the work space, shown in Figure 8-(b), where the essay task based on the can-do descriptor is displayed and they are asked to write their essays in the field at the bottom. When they click on the “save” button, the whole essay data together with all the person- and task-related metadata will be saved onto the server. The same thing can be done for speaking tasks, where students press the recording button and speak using the built-in microphone. In the current system, English and Chinese can be processed using a voice recognition system¹³, which will automatically convert your speech into orthographical data.

This is a quite simple design, but if used properly, it would be a very useful tool to collect learner production data in a very cost-efficient way. One can assign either spoken or written tasks related to target can-do descriptors and ask students to record their performance online. It is possible to keep track of students’ progress if a series of spoken or written output is recorded on the server during the course. The system saves all the speech and text data for individual learners with all the details of task and student information. This system can be used for both teaching and research. In the classroom, teachers can provide more valid CEFR-based grading by evaluating students’ performance in speaking and writing with this system. The system can gather all the students’ data in different languages from the beginning of their study till leaving university. It can contribute to the creation of L2 learners’ production data in multiple languages and this has much potential for future research as big data.

7. Conclusion

With the growing influence of the CEFR, attempts have been made to reconstruct the entire framework of teaching and assessing foreign languages using the CEFR. The CEFR-J Project is one such example. This study has reported ongoing projects applying CEFR-J resources for teaching different languages. While criticism still persists about the validity of the CEFR as a generic language framework, the present author believes that the validation process of such a framework and accompanying resources is quite intriguing as a research topic. The evaluation of our

multilingual resource development based on the CEFR-J is yet to be seen, but the approach taken by the CEFR-J x 27 project is moving in a promising direction in that resource-rich languages such as English could give support to under-resourced languages in terms of pedagogical content and methods.

8. Acknowledgements

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¹³ For this, Sinewave Inc. provides technical support on our system.

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